Environment Canada Environnement Canada

A STUDY OF ENVIRONMENTAL REPORTING IN CANADA

THE STAKEHOLDER GROUP ON ENVIRONMENTAL REPORTING

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March 1987

The contents of this report are the opinions of the members of the Stakeholders Group on Environmental Reporting and may not reflect the views of all of their constituents. Additional copies of this report can be obtained from:

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EXECUTIVE SUMMARY

The Stakeholder Group on Environmental Reporting was established in 1985 to consider improvements to environmental and resource data collection and reporting in Canada. This position paper reviews the current international interest in environmental reporting, considers shortcomings in existing Canadian environmental data collection programs, and makes recommendations on new institutional arrangements for improving environmental reporting.

The members of the Stakeholder Group include representation from industry, labour, environmental organizations, consumer organizations, federal and provincial governments, and the scientific community. The contents and recommendations contained in this position paper have been circulated by Stakeholder Group members among their constituents and therefore represent a wide range of national interests.

Environmental reporting, as addressed in this position paper, is defined as **the systematic measurement, collection, storage/retrieval and publication of environmental and resource data which focus on the interactions between human activity and the environment.** The Stakeholder Group's position stresses the importance of this information for the proper functioning of a healthy, safe and efficient economy. The information must be comprehensive, reliable, easily accessible, and meet the needs of all "stakeholders in the environment".

Many countries, including Canada, are becoming more concerned with the overall assessment of environmental quality and natural resources. Environment Canada has recently published the "State of the Environment Report for Canada" and Statistics Canada has produced "Human Activity and the Environment--A Statistical Compendium". Other countries are also working on state of the environment reports and developing databases of key environmental and resource information.

While the publication of Canadian state of the environment reports is an important first step towards a comprehensive environmental reporting system, the Stakeholder Group has identified several shortcomings in current Canadian data collection and reporting programs.

The most significant shortcomings stem from the fact that there is no overall coordination of the collection of data on environmental quality and natural resources. Information is collected by federal, provincial, and other agencies to meet their specific interests or mandates. Consequently there are data gaps, and existing data are not always reliable or accessible. There are insufficient environmental and resource data available to allow important risk analysis and epidemiological studies to be carried out, or to create a public understanding of the effects of human activities on the environment.

The Stakeholder Group feels that it is essential that institutional arrangements be put in place to ensure that a comprehensive, reliable, and easily accessible set of environmental quality and natural resource data is collected, updated and made available on a regular basis. Accessibility of information, data quality control, and independent assistance in data interpretation are as important as the actual publication of key environmental data. The scope of the information collected must also be wide. It should include natural resource as well as environmental quality data, and also include information on public responses to environmental and resource problems such as regulation, policy changes, expenditures, etc. A framework defining the scope of the interactions between human activity and the environment is included in the position paper to illustrate the wide range of information required for environmental reporting.

The Stakeholder Group feels that environmental reporting is a widely supported and very important activity. Sufficient funds should be committed to it, with the long term view of setting up an independent environmental reporting agency. The Group understands, however, that it would be difficult to set up a new, independent, institution at this time. The Group therefore recommends that a temporary environmental reporting body be set up within Environment

Canada, separate from existing departmental activities, and guided by an Advisory Council drawn from a wide variety of national interests or stakeholders. This body should operate within Environment Canada only until such time as resources are available to move this function to an independent agency or a National Council on the Environment.

The recommendations of the Stakeholder Group on Environmental Reporting are as follows:

- A long-term comprehensive plan should be developed for the collection and management of reliable, credible, and publicly accessible environmental quality and resource data. This plan should be developed in cooperation with Statistics Canada and all federal, provincial, and other agencies that collect environmental and resource data, and with input from representatives of all national interests concerned with environmental reporting.

- Given the wide range of support for environmental reporting from all national interests, resources should be committed to the setting up of a permanent independent environmental reporting agency and the establishment of a permanent Advisory Council on Environmental Reporting. Until sufficient resources are available to support a new agency, an environmental reporting group should temporarily be set up within Environment Canada, independent of existing departmental activities.

- The environmental reporting agency should be responsible for developing a comprehensive framework for environmental reporting; documenting existing Canadian databases; coordinating data collection by federal, provincial and other agencies; identifying data gaps; ensuring that data are accessible to all who are interested; interpreting data for those who require assistance; publishing key environmental data as necessary; and developing and updating national environmental and resource databases as appropriate.

- The Advisory Council on Environmental Reporting should be drawn from national interests including industry, labour, consumer and environmental organizations, federal and provincial governments, and the scientific community. It should be a continuing institution supported by a small secretariat and be responsible for providing input from all interests on the scope and type of environmental and resource information that should be collected and made available. The Council must be allowed to guide the operation of the environmental reporting agency and have some control over its policies and initiatives.

- The scope of environmental reporting must include information on a complete range of human activities which affect the environment, and include information on the health of natural resources such as soils, forest, and fisheries, as well as environmental quality information.

- Quality control of information collected for environmental reporting is very important. Standards of accuracy and methods of analysis must be adhered to and developed where necessary, and the accuracy of data, together with the reason it was collected, and by whom, must always be reported along with the information itself.

- Environmental data must be accessible to all those who need it (within the regulations of the Privacy Act). A well-documented network of environmental and resource databases should be identified which contain reliable, accessible, and credible environmental information. Ways in which these databases may be accessed should be widely publicized.

- The new plan for environmental reporting should be accompanied by a strong educational effort which focuses on the interactions between human activity and the environment and which uses information generated by the database network.

- The new plan for environmental reporting should be linked to and be compatible with international environmental information systems such as GEMS and MAB. To ensure international compatibility, methods of measurement and data standards should be related to the recommendations of the Committee on Data for Science and Technology (CODATA) of the International Council of Scientific Unions.

INTRODUCTION

In June 1985, a Task Force made up of interested "stakeholders in the environment" from both federal and provincial governments, business, labour, environmental groups and consumers, met at the Niagara Institute to discuss the current state of environmental reporting in Canada, and to consider new institutional arrangements for future environmental data collection and reporting.

Following this meeting, a Stakeholders Group on Environmental Reporting was established to continue work in this area and to implement the recommendations of the Task Force over a 3 year period. This position paper has been produced by the Stakeholder Group, with the assistance of Marbek Resource Consultants Ltd., as a first step in developing a national consensus on environmental data collection and reporting.

The contents of the paper have been widely discussed among national and regional industry associations, environmental groups and other interests, and therefore the views and recommendations in the paper represent those of the Stakeholder Group and a wide cross-section of their constituencies across the country.

All members of the Stakeholder Group would like to stress the importance they place on the need for comprehensive, accessible, and reliable environmental and resource information. Both economic and environmental data are essential for the proper functioning of a healthy, safe and efficient economy. The Stakeholder Group considers the collection and reporting of environmental information as a very important role for government and would like to see sufficient resources committed to it.

The current members of the Stakeholder Group are as follows:

- Industry
  - Charles Ferguson, INCO Ltd., Toronto, Ontario
  - Dr. Frank Frantisak, Noranda Inc., Toronto, Ontario

- Labour - Daniel Ublanski, Energy and Chemical Workers, London, Ontario

- Consumers - Maryon Brechin, Consumers Association of Canada, Burlington, Ontario

- Environmental Groups - Colin Isaacs, Pollution Probe, Toronto, Ontario
  - Susan Holtz, Ecology Action Centre, Halifax, Nova Scotia

- Provincial Governments - Jean Piette, Ministère de l'Environnement du Québec, Québec

- Federal Governments - Diane MacKay, Environment Canada, Ottawa, Ontario
  - Rob Hoffman, Statistics Canada, Ottawa, Ontario

- Scientific Advisors - Dr. Fred Roots, Environment Canada, Ottawa, Ontario
  - R.A. Jennes, Economic Council of Canada, Ottawa, Ontario
  - Dr. Nantel, Université de Laval, Québec

Besides the organizations represented by the members of the Stakeholder Group, the position paper has been discussed with the following organizations:

- Canadian Chemical Producers Association
- Canadian Mining Association
- Canadian Manufacturers Association
- Canadian Steel Producers and Foundary Association
- Petroleum Association for the Conservation of the Canadian Environment
- Conservation Council of New Brunswick
- Newfoundland/Labrador Wildlife Association
- S.T.O.P.
- Crossroads Resource Group
- Alberta Fish and Game Association
- Yukon Conservation Society
- Canadian Nature Federation
- World Wildlife Fund Canada
- Friends of the Earth Canada

CHAPTER 1

A BACKGROUND TO ENVIRONMENTAL REPORTING

1.1 WHAT IS ENVIRONMENTAL REPORTING?

While concerns about environmental problems have been expressed for many years and there have been national and international efforts to minimize them, only recently has there been more recognition by governments around the world that a healthy environment and population are necessary for a healthy economy. Policy makers previously interested only in economic indicators are now becoming much more interested in environmental and resource data that can provide an assessment of the state of the environment or a measure of the depletion of important resources such as soil quality, forests etc. This coincides with the long-stated demands by ordinary citizens for more information on specific environmental health hazards in air, drinking water, etc.

To meet this demand for environmental data, individual governments, non-government organizations, and international agencies have begun to analyze selected environmental data collected for a wide range of more specific purposes (from weather data to human blood analysis), and publish the results in a form that provides an overall regional, national, or international picture of environmental health. It has also led to the development of a new discipline called **environmental reporting**, which may be defined as the systematic measurement, collection and publication of environmental and resource data which focus on the interactions between human activity and the environment.

Environmental reporting must necessarily be wide in scope, covering both natural resources and environmental quality, and look at all types of interactions within an ecosystem. In this way it differs from data collection programs designed for the management of a single resource or the assessment of a single pollution problem. Environmental reporting may draw on information collected under these special data collection programs, but it will seek to identify the important changes that are occurring in our environment and natural resources as a result of human activities.

1.2 ENVIRONMENTAL REPORTING IN CANADA

1.2.1 Environmental Databases and Data Sources

Many federal and provincial government departments maintain databases of environmental information collected under their specific mandates. A description of federal databases is given in the publication "Federal Government Databases Relevant for Enviromental Risk Management", Statistics Canada, February 1986. The data from most of these sources is available to the general public. Besides government databases, a large amount of environmental data is also collected for specific purposes by industry, hospitals, universities, research organizations, and government departments. Most of this data is not, however, generally available, either because it is considered confidential, or because there is no mechanism to make the data available to potential users or let them know that it exists.

Many users of existing environmental data are concerned about its accessibility and reliability. At the same time they find it valuable in their work, and consider its collection a worthwhile public expenditure. The desire is for more complete coverage and for data that will provide a better understanding of key economic/environment relationships.

1.2.2 The 1986 State of Environment Reports

In 1981, Statistics Canada and Environment Canada started to consider the publication of national "state of the environment" reports. Following a survey of the views of non-government organizations representing industry, labour, consumers, environmental, and other interest groups, a report was prepared with sections on agro, forest, and aquatic ecosystems, wildlife, land use changes, contaminants, and legislation/expenditures, based on an assessment of existing data sources and databases. The report, entitled "State of the Environment Report for Canada" was published in April 1986. At the same time a summary report entitled "Canada's Environment: an Overview", contain-

ing highlights and prepared for general public use, was also published. The reports use the ecozone approach to environmental reporting, describing the current state and trends that are occurring in each. Because of gaps that exist in the environmental information available for assessment, the reports do not cover all environmental concerns or trends, and do not treat all ecozones or regions of the country equally.

1.2.3 A Statistical Compendium on Human Activity and the Environment

Also published in April 1986, "Human Activity and the Environment - A Statistical Compendium" represents a departure for Statistics Canada from its traditional role of collection and publication of only socio-economic survey data. It is within the Department's mandate, however, to collect any data of national significance, and the Compendium represents a first step in offering the more comprehensive set of national statistics that is necessary for a healthy and well functioning national economy.

1.2.4 The Stakeholder Group on Environmental Reporting

This Group of interested "Stakeholders in the environment" from federal and provincial government departments, labour, business, environmental organizations, and consumers was formed out of a concern that there was no clear, comprehensive reporting on the state of Canada's changing environment. The Stakeholder Group developed from a Task Force on environmental reporting which met at the Niagara Institute in June 1985. The report of this Task Force, outlining the basic needs for a comprehensive approach to environmental reporting, is given in Appendix A.

1.3 ENVIRONMENTAL REPORTING IN OTHER COUNTRIES

Like Canada, several other countries have started to consider a more comprehensive approach to environmental reporting, by developing a more complete and integrated approach to the collection of environmental data and by publishing

state of environment reports. Most member countries of the Organization for Economic Cooperation and Development (OECD) are developing environmental reporting systems and several non-government organizations are doing the same. Appendix B gives the tables of contents of three state of environment reports from different types of organizations and parts of the world--one by the government of France; a second by the Conservation Foundation, a United States non-government organization; and a third by the Centre for Science and Environment, an Indian non-government organization. Data sources and methods of data interpretation for each of these reports are not known at the present time, but they show the widespread interest in environmental reporting.

In several countries, data collection is carried out specifically to provide a national picture of environmental quality. In Japan, an annual environmental audit must be presented to parliament to provide decision makers with a better understanding of current environmental costs and the current value of natural resources. In Sweden a special annual state of the environment report is issued stressing the value of the environment to people and the economy, and a national education program is mounted around the report.

1.4 ENVIRONMENTAL REPORTING BY INTERNATIONAL ORGANIZATIONS

The OECD itself produced a compendium of environmental data in 1985. The table of contents for this compendium is given in Appendix C. The organization is also developing a database for ongoing reporting called the System of Information on Resources and the Environment (SIREN).

Another international database of environmental information is being developed under the United Nations Environment Program (UNEP) Global Environmental Monitoring System (GEMS). GEMS was started in the early 1970s to provide a truly international assessment of regional and continental environmental problems, based mostly on remote sensing. The Global Resource Information Database (GRID) was launched in 1984 to store information collected under GEMS.

Other activities by United Nations agencies include databases on forests, fisheries and agriculture maintained by the Food and Agriculture Organization

(FAO) and a new project by the Economic Commission for Europe (ECE) to produce a Compendium of Environmental Statistics. The World Resource Institute, an international non-government organization, is putting together a World Resource Database. The table of contents of its first publication, "World Resources 86", is given in Appendix D.

CHAPTER 2

THE STAKEHOLDER'S POSITION ON ENVIRONMENTAL REPORTING

2.1 THE NEED FOR ENVIRONMENTAL REPORTING IN CANADA

Comprehensive environmental information is required in Canada to meet the following needs:

- To make a clear statement on the present state of the Canadian environment, trends in environmental quality as they are affected by human activity, and identification of national and regional environmental problems, in order to facilitate the assessment of environmental and resource management policies.

- To provide widely accessible and credible environmental and resource data which will lead to a better understanding of environmental problems and their linkages with human activities.

In other words, the ordinary Canadian requires indicators which show whether human health, natural resources, and the ambient quality of the environment is improving or getting worse, what the causes are, and what is being done to maintain environmental quality and stocks of natural resources. At the same time, policy makers, researchers, and representatives of different national and regional interests or Stakeholders require information which allows them to assess risks, design appropriate responses, and throw more light on the complex linkages between economic activity and environmental problems.

While most Stakeholders have a common desire to have a clean environment, each also has a specific set of interests:

- Industries have a primary interest in remaining profitable. They are interested in the effects of industrial waste residuals and comparison of the costs of reducing environmental risks versus the cost of waste

reduction. At the same time they are interested in ensuring that the long term viability of a resource or environment upon which they depend is maintained, and being seen as good corporate citizens working for a clean environment.

- Labour organizations have a prime interest in retaining a safe and clean work environment, and secure employment. They are also interested, however, in ensuring that, as local residents, their members have a healthy environment and adequate services, and as consumers, they are protected by standards for food, water, air, etc. They therefore attach high priority to human health and environmental quality data, particularly in industrial communities. Labour organizations are more skeptical of purely numerical risk analysis, based only on measured data and estimated costs. They believe that the valuation of environmental risks and impacts must involve participation of all these affected and be an open, equitable process. This requires some assistance from an unbiased source to interpret environmental data.

- Consumers have an interest in ensuring that in general, food, water and air are maintained free of contaminants and that consumer products remain safe and non-polluting. They are also particularly concerned about the impact of environmental contaminants and new development on the quality of air, water, parks and other public facilities. Like labour organizations, they also need unbiased assistance to interpret environmental information.

- Environmental groups have an interest in protecting the general health of the environment or a specific aspect of it. Many also stress the critical linkages between economic activity and the health and status of the population, natural resources and the environment in general. They feel that a full range of environmental data is required, within practical limits. Environmental organizations are called upon to work on all types of environmental, health, and resource problems, and need access to good data to work effectively. Lack of financial resources is often a constraint, however.

- Federal and Provincial Governments have the responsibility for making economic, resource, and regulatory decisions which can affect human and ecosystem health. They also have the responsibility for collecting and publishing economic and resource data of national or regional importance. Governments are particularly interested in trends and changes in environmental quality and resource stocks.

While these interests may sometimes conflict, and their interpretation of environmental problems may vary, the need for accurate, reliable environmental data is common.

2.2 CURRENT SHORTCOMINGS IN ENVIRONMENTAL DATA COLLECTION AND REPORTING IN CANADA

Most existing Canadian environmental data collection and reporting arrangements were developed to meet a specific environmental quality or resource management need. They do not provide the comprehensive set of environmental data necessary to make today's complex decisions, and to provide a complete overview of Canada's environment. The more serious shortcomings are as follows:

- While a great deal of important Canadian environmental and resource data was collected for the 1986 State of Environment reports and the Statistical Compendium on Human Activity and the Environment, there is no comprehensive system or network of information sources that would allow ongoing public access to environmental data or instructions on how to obtain these data.

- There is no comprehensive "framework" which describes the scope or extent of the interactions between human activities and the environment, upon which an environmental reporting system could be based and which would provide a better public understanding of these interactions.

- A large amount of useful data is collected by industries, hospitals, universities, and research institutions for specific purposes. There is little outside knowledge of their existence and often no mechanisms for obtaining these data.

- Much of the useful data collected across the country by government agencies, industries, universities, etc. is designated confidential--often for no apparent reason--and is therefore unavailable. In other cases, agencies may decide that environmental data should not be made available, even though there was no original intent to withhold results and the raw data are freely available from those researchers who actually carried out the sampling and analysis.

- Current government data collection programs are often fragmented. They are designed to meet specific local or regional needs or the needs of a specific mandate. This results in a set of environmental data which lacks the statistical consistency for comprehensive environmental reporting. There are often gaps in environmental data, and several different federal and provincial agencies must be approached to obtain comprehensive information. Federal and provincial departments of health, environment, natural resources, and agriculture all have the mandate to collect limited information on pesticides, for example.

- There is no systematic way of identifying data gaps and modifying current data collection programs.

- In general, there are not sufficient environmental or resource data available to understand the complex linkages between economic activity and environmental or resource quality, or allow more effective risk analyses and epidemiological studies to be carried out.

- There is no independent, agency or institution capable of assembling environmental data and assisting in its interpretation.

- One of the most important gaps in environmental data is the lack of human, animal, and plant exposure data on toxic substances. Most data of this type are currently collected to meet certain minimum standards for products (e.g. residues in fruits etc.) or for some specific, usually workplace related, human exposure to a toxic substance. There is no adequate ongoing national monitoring program to determine levels of toxic substances in human body fluids, wildlife or sport fish, etc. This

exposure information is essential if the presence of a toxic substance in the environment (coming from an identified source) is to be related to a health effect in humans or changes in fish or wildlife populations. Without this information, decisions on the production, use, transportation, and disposal of toxic substances will not be able to be made objectively. Several other data gaps exist, especially where new environmental concerns have developed.

- Regionally, far more environmental data of all kinds have been collected around major centres such as Toronto and Montreal. Water quality data tend to be concentrated in specific river basins where major studies have been carried out. Air quality data tend to be available mostly in urban centres. There is thus a general need for more comprehensive sampling in all areas.

2.3 FEATURES OF A COMPREHENSIVE ENVIRONMENTAL REPORTING SYSTEM

To address the current defficiencies in environmental reporting described above, a comprehensive new approach is required to identify, collect and report environmental data of national and regional importance.

The approach must:

- Establish a framework which defines the scope of the interactions between human activity and the environment. Such a framework would:

  - help in the understanding of the important linkages between human activity, environmental quality and natural resources; and

  - provide a framework for choosing which environmental quality and natural resource information needs to be collected under an environmental reporting system.

- Fully document all existing federal, provincial and other data collection programs concerned with environmental quality and natural resources, including information on sampling procedures, method of analysis, data accessibility, etc.

- Provide an ongoing analysis of federal, provincial and other data collection programs. This analysis should:

  - recognize gaps, ambiguities and uncertainties in existing data; and

  - establish new priorities as new environmental and resource concerns are identified.

- Coordinate federal, provincial and other data collection programs so that:

  - the required information is available for environmental reporting;

  - data collection programs are modified to fill in data gaps and provide data to address new environmental concerns;

  - there is more consistency in sampling frequency, sample preservation, and method of analysis, and proper reporting of this information along with the results;

  - there is more coordination between agencies which all collect information on the same important contaminants.

- Ensure that all environmental quality and natural resource information (within the regulations of the Privacy Act) is accessible to all those who require it by:

  - identifying a network of environmental and natural resource databases which contain important environmental quality and resource data;

  - providing instructions on how to access the information in these databases, indicating the cost, if any, of obtaining this information;

  - publishing national and regional reports summarizing important environmental and resource data, and indicating significant trends or changes;

- assisting data users in the interpretation of enviromental and resource data; and

- if appropriate, developing a national database of key environmental and resource information.

Such an approach to environmental reporting would have to be manageable and practical at the outset, yet include a means to become gradually more comprehensive. It would need to work within existing statistical economic and resource frameworks, yet include innovative approaches toward economic and environmental accounting as they are developed. The development of a Canadian environmental reporting system would benefit from experience gained in other countries. It would also be important to work with these countries and the international community to develop consistency and compatibility in the measurement and reporting of environmental quality and resource data.

2.4 A FRAMEWORK FOR ENVIRONMENTAL REPORTING

Selection of the types of environmental quality and resource information that should be collected for environmental reports requires that the economy and environment be viewed as a complete system. This is necessary first to demonstrate the interactions between human activity and environmental impact, and second to ensure that collected environmental data cover all the relationships and feedback effects that link human activity, environmental impact, and changes in health or resource base. A "framework" is necessary to define the scope of these linkages between the economy and the environment, and to help understand these linkages. It also leads to a more comprehensive and effective environmental reporting system.

Without such a framework there is a danger of ad hoc and sectoral approaches to data collection continuing. No practical, rigorous policy decisions or responses can be made unless an environmental problem can be followed from its source, through each part of environment, to its effect on human or ecosystem health or resource stocks.

One framework that has been suggested for viewing the economy and the environment as a complete system, and for categorizing environmental and resource information, is the STRESS framework, designed by Statistics Canada for database development. Details of the STRESS framework are given in Appendix E and described more fully in the Statistics Canada publication, "Federal Government Databases Relevant for Environmental Risk Management". The STRESS framework has also been used to categorize data in the Statistics Canada publication "Human Activity and the Environment - A Statistical Compendium."

To develop an ongoing mechanism for choosing what environmental information should be reported, it is suggested that the STRESS framework be modified slightly, and that it also includes measures of the effectiveness of societies' responses to environmental problems. These responses can take the form of changing the economic activity itself (e.g. reduction of the waste residual by process change etc.); requiring a reduction in environmental stress (e.g. more effective waste treatment); or the setting of some standard for environmental quality or human exposure (e.g. a drinking water standard). In other words, many different types of response can be made. They can involve regulation, expenditures, the re-ordering of priorities, and changes in the selection of technology.

A modified framework that could be used for choosing which environmental and resource information should be reported is shown in Figure 1, (page 27). The suggested data categories are as follows:

I. **Environmental Assets**, which would include the size and evolution of resource stocks and the effectiveness of management responses and expenditures.

II. **Agents of Environmental Change**, which would include data on all human activities which have the potential for producing environmental change; actual pollution loadings, land conversions, etc. resulting from these economic activities; and the effectiveness of current standards, licences, codes, and expenditures, etc. which currently control these impacts.

III. **Measures of Environmental Quality**, which would include actual levels of air, water and soil quality; human health and exposure measurements, etc.; and the standards, regulations, programs, and expenditures, etc. designed to achieve or maintain target levels.

The framework could be further developed by introducing specific sub categories. For example it would be easier to identify required environmental information if specific industries (e.g. mining, pulp and paper, chemical, etc.) or specific fisheries (e.g. Great Lakes, Atlantic, Pacific, etc.) were each considered separately. The basic objective would be to have a guiding framework within which the environmental information required can be identified, while at the same time ensuring that a practical and comprehensive mechanism for environmental reporting is developed.

In applying such a framework to environmental reporting, the following multiple, indirect and delayed causes and effects must be considered:

- Multiple causes and effects: In many cases an effect can have multiple origins. For example, the presence of a contaminant such as a toxic organic substance in a body of water can be due to several causes - agricultural run-off, leaking landfill sites, direct effluent discharges, or airborne dispersal.

- Indirect causes and effects: In some cases, the primary cause for human health effects will not be related to the outside environment. Exposure in the workplace and in buildings are often much more severe than ambient exposure to a condition or a contaminant which causes a health effect.

- Delayed causes and effects: Changes in a large number of environmental and human health parameters may be related to an event or exposure that occurred several months or years before.

The design of an environmental reporting system must take these complex cause/effect relationships into account, and seek to throw as much light on them as possible.

When selecting environmental information for reporting, it will be appropriate, in some cases, to use "indicator" or "representative" parameters which might provide an overall assessment of environmental quality or resource stocks. For example, biological species can sometimes be used as an early warning of environmental change. Indicator parameters can also be used if the relationship to other parameters is well known (e.g. use of coliform bacteria as indicators of the presence of pathogens). Most organic contaminants disperse throughout the environment and may be found in air, water, sediments, and biota in varying concentrations depending on their volatility and other properties. As the behaviour of these substances become better known, it may be possible to measure their presence in a limited number of media. Until that time, however, more complete measurements will be necessary.

In general, a pragmatic and practical approach must be taken to the selection of information for environmental reporting. The bulk of the information originally selected will have to be based on existing data sources. It is important, however, to have a comprehensive framework or mechanism for selecting the preliminary requirements, reviewing priorities and data gaps, and identifying new requirements.

A set of preliminary information requirements for each data category of the selection framework is shown in Figure 1, (page 27).

2.5 NEW INSTITUTIONAL ARRANGEMENTS FOR ENVIRONMENTAL REPORTING

If the improvements in environmental data collection, interpretation and reporting discussed above are going to occur, a new institutional approach is necessary covering activities in the following areas:

- input from all interested "stakeholders" in the environment
- selection of parameters for environmental reporting
- co-ordination of environmental and resource data collection programs

- access to environmental quality and resource data
- interpretation of environmental data
- storage and reporting of environmental data.

The new institutional approach should have the following features:

- It should make environmental and resource data accessible to all those interested.
- It should be national, independent and professional.
- It should provide environmental information on a regular basis.
- It should build a reliable, statistically consistent information base on key environmental issues.
- It should be governed by an independent body, actively guided by all national interests.
- It should be able to evaluate emerging environmental issues and provide assistance in the interpretation of environmental and resources data when needed.

The following institutional arrangements should be made:

- An Advisory Council should be set up to guide environmental reporting in Canada.

- A single agency should be designated as being responsible for environmental reporting and the coordination of environmental and resource data collection programs.

2.5.1 An Advisory Council on Environmental Reporting

It is recommended that an Advisory Council on Environmental Reporting be established to guide environmental reporting in Canada. The Advisory Council's responsibilities would include the following:

- Defining the basic scope and information requirements for environmental reporting using a framework such as that shown in Figure 1.

- Carrying out an ongoing consultation process with all stakeholders and their constituencies.

- Participating in an ongoing review of the environmental reporting process, emerging environmental issues, and environmental and resource data collection programs.

- Ensuring that all agencies engaged in environmental data collection and reporting continue to meet stakeholder's environmental reporting requirements.

- Ensuring that environmental and resource data are accessible to all who require it.

- Acting as a guiding body for the designated environmental reporting agency (see below).

While it is not possible to have delegates from all interest parties on an Advisory Council, there is a need to have good representation from all stakeholders. Each national or regional interest would be best represented by one or two delegates from associations rather than individual industries, unions, environmental or consumer groups. Federal and provincial department representatives should be drawn from several different mandates--environment, health, agriculture, natural resources. There is also a need to have representation from the scientific community as an additional independent stakeholder.

Any Advisory Council would have to rely heavily on government agencies which collect environmental data for technical advice. It would be appropriate, however, to have technical advisors associated with the Council in the following areas:

- Ecosystems
- Health
- Natural Resources
- Statistics
- Economics
- Law.

A facilitator and secretariat would also be required to coordinate and support Council activities and advise on data dissemination, etc.

Advice would also be sought from national technical committees such as the National Research Council Associate Committees.

2.5.2 A Designated Environmental Reporting Agency

In addition to the Advisory Council of Stakeholders, a single agency must be designated as being responsible for environmental reporting in Canada. The general responsibilities of this agency would include:

- Drawing up a framework to define the scope of human activity/environment interactions and a detailed starting list of data requirements for environmental reporting based on priority information requirements defined by the Advisory Council;

- Documenting data sources that are easily accessed, including information on sampling frequency, method of analysis, accuracy, means of data access, etc.;

- Identifying existing data that are difficult to access, developing means to access the data;

- Identifying required new data collection programs, working with appropriate agencies to implement them;

- Designating a network of databases as national and regional sources of environmental and resource data;

- Developing data collection and reporting protocols (see below);

- Establishing a system for public access to environmental and resouce data from the network of databases, including providing information on what data are stored in each database and how to access them;

- Coordinating the collection of environmental and resource data by federal, provincial, municipal and other agencies, and maintaining up to date information on all data collection activities;

- Reviewing ongoing research in risk assessment, environment-economic accounting, epidemiological studies, etc.;

- Providing assistance in the interpretation of environmental data;

- Providing liaison with other national and international environmental reporting initiatives.

- Producing environmental reports for the following purposes:

  - to identify major environmental and resource trends
  - to identify emerging environmental issues
  - to provide information required for risk assessment, epidemiological and other research
  - to assist in the assessment of the effectiveness of current environmental and resource management efforts
  - to project the future impact of current trends or new environmental policies using modelling etc.

- Establishing, as appropriate, and as time and resources permit, a national database of key environmental quality and natural resource data for the purpose of environmental reporting and public access.

The designated agency would rely on expert advice from federal and provincial departments of environment, health, agriculture, etc. These departments would also have to be responsive to the coordinating role of the agency, providing information on the data collection activities within their mandates, and modifying their collection activities as needed. Statistics Canada would play a key advisory role as well as providing information on human activity and resource data which it now collects. Statistics Canada's experience in collecting and reporting reliable and credible data, together with its

experience in manipulating large databases would be invaluable to the environmental reporting agency.

Once the starting list of environmental data requirements has been drawn up, the designated environmental reporting agency should develop the protocols needed to govern the collection of data and the ongoing reporting process. The development of these protocols will also reduce the current fragmentation between data collection programs.

The data collection protocol should include the following:

- Definitions for parameters
- Source of information or sample
- Location and frequency
- Acceptable methods of sampling and preservation (if applicable)
- Acceptable methods of analysis (if applicable) and their accuracy
- Quality control, including accreditation of laboratories
- Differences in quantitative and qualitative information.

It should be noted here that a report on the need for international data collection protocols entitled "Improvement and Harmonization of Techniques and Practices of Environmental Measurement" is being prepared for the next Economic Summit.

The reporting protocol should include the following:

- How to report data accuracy
- Method of data presentation--raw data, maps, diagrams, etc.
- Format for reporting--summaries, annual reports, trends or interpretation of specific problems, raw data, etc.
- Method of reporting--ecozones, ecosystems, regions, provinces, river basins, etc
- Methods for analysis of trends
- Standards, guidelines and desired resource levels for comparison/interpretation purposes
- Methods to measure effectiveness of responses

- Means to identify new data needs
- A procedure for instituting a new data collection program
- Methods for review of feedback from researchers, and the general public
- Classification of information needs with respect to current and near term availability, confidentiality, etc.
- Arrangements for consultation with stakeholders and their constituents.

The designated environmental reporting agency should preferably be an independent national body, perhaps supported by Environmental Information legislation. This independent body would be similar in function to the Economic Council of Canada except it would be concerned with analysis of environmental and resource data. Given the current need to limit new expenditures, the alternative would be to temporarily establish an independent body or group for environmental reporting within Environment Canada. In view of the need, however, for **credibility, reliability, independence and accessibility,** the group would have to be set up to operate at "arms length" from other departmental activities. It would have to fulfill all of the designated environmental reporting agency responsibilities described above, and be guided by the Advisory Council on Environmental Reporting. Independence, and a continuing input from national and regional stakeholder interests cannot be sacrificed.

2.6 FUNDING THE NEW INSTITUTIONAL ARRANGEMENTS

The required funding for Advisory Council activities could come solely from government, or be shared by all Stakeholders. If non-government organizations were to contribute to the process, some form of indirect government support would be required, or else some method would have to be instituted to increase general public support of these organizations by designating them as Stakeholder representatives.

To fund the activities of the designated environmental reporting agency, sufficient annual commitments would need to be made to cover reporting,

coordination, and compilation activities. Significant funding might also be needed for additional data collection. In the longer term, it would be appropriate to commit an amount similar to the funds currently allocated to the Economic Council of Canada (about $10 million annually). The actual cost of collecting, reporting and providing environmental and resource data to other potential users could be partially recovered through the use of annual user fees or per report or search fees.

2.7 RECOMMENDATIONS

The Stakeholders Group on Environmental Reporting would like to make the following recommendations with respect to environmental reporting in Canada:

- A long-term comprehensive plan should be developed for the collection and management of reliable, credible, and publicly accessible environmental quality and resource data. This plan should be developed in cooperation with Statistics Canada and all federal, provincial, and other agencies that collect environmental and resource data, and with input from representatives of all national interests concerned with environmental reporting.

- Given the wide range of support for environmental reporting from all national interests, resources should be committed to the setting up of a permanent independent environmental reporting agency and the establishment of a permanent Advisory Council on Environmental Reporting. Until sufficient resources are available to support a new agency, an environmental reporting group should temporarily be set up within Environment Canada, independent of existing departmental activities.

- The environmental reporting agency should be responsible for developing a comprehensive framework for environmental reporting; documenting existing Canadian databases; coordinating data collection by federal, provincial and other agencies; identifying data gaps; ensuring that data are accessible to all who are interested; interpreting data for those who require assistance; publishing key environmental data as necessary; and developing and updating national environmental and resource databases as appropriate.

- The Advisory Council on Environmental Reporting should be drawn from national interests including industry, labour, consumer and environmental organizations, federal and provincial governments, and the scientific community. It should be a continuing institution supported by a small secretariat and be responsible for providing input from all interests on the scope and type of environmental and resource information that should be collected and made available. The Council must be allowed to guide the operation of the environmental reporting agency and have some control over its policies and initiatives.

- The scope of environmental reporting must include information on a complete range of human activities which affect the environment, and include information on the health of natural resources such as soils, forest, and fisheries, as well as environmental quality information.

- Quality control of information collected for environmental reporting is very important. Standards of accuracy and methods of analysis must be adhered to and developed where necessary, and the accuracy of data, together with the reason it was collected, and by whom, must always be reported along with the information itself.

- Environmental data must be accessible to all those who need it (within the regulations of the Privacy Act). A well-documented network of environmental and resource databases should be identified which contain reliable, accessible, and credible environmental information. Ways in which these databases may be accessed should be widely publicized.

- The new plan for environmental reporting should be accompanied by a strong educational effort which focuses on the interactions between human activity and the environment and which uses information generated by the database network.

- The new plan for environmental reporting should be linked to and compatible with international environmental information systems such as GEMS and MAB. To ensure international compatibility, methods of measurement and data standards should be related to the recommendations of the Committee on Data for Science and Technology (CODATA) of the International Council of Scientific Unions.

FIGURE 1 A FRAMEWORK FOR ENVIRONMENTAL REPORTING (WITH EXAMPLES)

I ENVIRONMENTAL ASSETS

	SIZE AND EVOLUTION OF STOCKS	RESPONSES
Water Resources	Supply quantity and area for various uses	Water management
Land Resources	Supply quantity and area by classification	Land use management
Forest	Supply quantity and age statistics	Forest management
Fish	Population and size statistics	Fisheries management
Wildlife	Population and location statistics	Wildlife management
Non-Renewable Resources	Mineral and fossil fuel reserves	Pricing policies, etc.
Man-Made Stock	Cultural and historic sites and national infrastructure	Restoration, land use restrictions, etc.

FIGURE 1 (continued) A FRAMEWORK FOR ENVIRONMENTAL REPORTING (WITH EXAMPLES)

II - AGENTS OF ENVIRONMENTAL CHANGE

	CHANGE AGENTS ACTIVITY	RESPONSES	ENVIRONMENTAL IMPACT ACTIVITY	RESPONSES
Generation of Waste Residuals				
Mining:	Production and acid gas/ heavy metal generation by Province	Assistance programs to develop new technology	Actual acid gas/heavy metal metal effluent flows by Province	Effluent regulations
Pulp and Paper:	Production and toxic waste generation by Province	Assistance programs to develop new technology	Actual toxic waste effluent flows by Province	Effluent regulations
Municipal:	Population and waste generation by major city	Waste reduction, water conservation programs, etc.	Actual sewage effluent and waste landfilled/recycled by major city	Waste treatment and recycling programs
Energy:	Power production and acid gas generation by Province	Energy conservation programs	Actual acid gas effluent flows by Province	Effluent regulations
Transportation:	Distance/volume of toxic substances	Programs to reduce transportation of toxics	Actual amount of toxic substances spilt, etc.	Transportation regulations
Agriculture:	Use of pesticides and fertilizers by Province	Programs on biological pest control and regenerative agriculture	Actual nutrient and pesticide run-off by Province	Soil conservation practices
(Chemical:)				
Permanent Environmental Restructuring				
Buildings:	Building starts and completions	Land use planning	Land conversions	Zoning and landscape conservation
Roads/Railways, etc.	New and expanded facilities	Land use planning	Erosion and habitat modification	Landscape conservation and environmental rehabilitation
Agriculture:	New land under cultivation	Land use planning	Wetland conversion	Environmental rehabilitation
(Energy:)				

FIGURE 1 (continued) A FRAMEWORK FOR ENVIRONMENTAL REPORTING (WITH EXAMPLES)

II AGENTS OF ENVIRONMENTAL CHANGE (continued)

	CHANGE AGENTS ACTIVITY	RESPONSES	ENVIRONMENTAL IMPACT ACTIVITY	RESPONSES
Harvesting				
Fisheries:	Production by fish and fishery (Atlantic, Pacific, etc.)	Controls on introduction of new technology	Catches by fish and fishery	Fishing regulations
Agriculture:	Production by commodity and Province	Controls on introduction of new of new technology	Yields by commodity and Province	Crop incentive programs
Forestry:	Production of wood products by Province	Controls on introduction of new technology	Tree harvest by Province	Replanting regulations, etc.
(Hunting:)				
Depletion of Non-Renewable Resources:				
Mining:	Mineral production by Province	Controls on introduction of new technology and substitution actions	Ore production by Province	Conservation, exploration, regulations, etc.
(Energy:)				
Natural Activity				
Floods:	Precipitation statistics	Improved forecasting	River and lake level statistics	Dyke programs, land use regulations, etc.
(Droughts:)				
(Earthquakes:)				
(Landslides:)				
Population Dynamics				
Growth:	Consumption per capita by Province	Resource conservation, advertising, etc.	Solid waste generation per capital, etc.	Financial incentives, controls, etc.
(Distribution:)				
(Migration:)				

FIGURE 1 (continued) A FRAMEWORK FOR ENVIRONMENTAL REPORTING (WITH EXAMPLES)

III ENVIRONMENTAL QUALITY

	QUALITY PARAMETER	RESPONSES
Air:	Toxic substance and acid gas analysis	Air quality standards/criteria
Water:	Toxic substance and bacteria analysis	Water quality standards/ criteria
Food:	Toxic substance and bacteria analysis	Standards for residuals, processing, etc.
Human Health and Exposure:	Toxic substance analysis in body fluids, etc. Mortality/morbidity statistics	Minimum exposure levels
Soil:	Humus content, productivity, salinity, acidity, etc.	Soil conservation, and regulated farming practices
Precipitation:	Acid deposition rates	Neutralization
Fish and wildlife populations:	Toxic substance analysis, occurrence of tumours, productivity, species diversity, etc.	Consumption restrictions etc.
Forests:	Forest depletion rate, species diversity, etc.	Reforestation programs, etc.
Landscape:	National Park usage, tourism statistics	Heritage programs, landscape improvement programs, etc.
Ecosystem Health:	Toxic substance analysis, productivity, diversity, biological indicators, etc.	Ecosystem management

APPENDIX A

NIAGARA INSTITUTE TASK FORCE

REPORT ON THE CHANGING

STATE OF THE ENVIRONMENT:

REPORTS, DATA, AND THE

SEARCH FOR NEW INSTITUTIONAL ARRANGEMENTS

June 1985

Task Force 3

Final
21.06.85

THE CHANGING STATE OF THE ENVIRONMENT:

REPORTS, DATA AND THE SEARCH FOR NEW INSTITUTIONAL ARRANGEMENTS

The Needs

There is concern that our environment and our economy may be put at risk when decisions are made - or not made - based on inadequate, unintegrated, or uncoordinated information. There is also concern that information which is available is mistrusted because of doubts about the impartiality of the various sources of information.

Among the public at large, and key stakeholder groups including business, labour, environmental organizations, federal, provincial and municipal governments, and others, there is a growing consensus on the need to re-examine arrangements for data collection, analysis and access with respect to environmental issues and economy-environment linkages.

In particular:

1. There is no clear comprehensive, regular statement and analysis of the changing state of the environment.

2. There is a perceived need for more relevant data collection in many environmental areas.

3. At the same time, there is underutilization of extensive data which is available.

4. There is no systematic way to identify important data gaps which may exist.

5. There is particular need to develop good data on economy-environment linkages.

6. Relevant data is important to evaluating environmental performance and stimulating environmental protection.

7. We must ensure there are smooth, well-organized data collection flows on environmental and environment-economy issues between federal and provincial governments and, where appropriate, with private sector organizations.

8. All interested stakeholders must have effective and timely access to significant environmental information.

9. A key issue is data credibility with all interested stakeholders.

10. There must be mechanisms for multistakeholder input on data collection, sythesis and integration.

The Rationale

1. Despite many existing and planned reports, and voluminous amounts of specific but uncoordinated environmental data, a clear statement of the changing state of the environment in Canada is not now available. There is no regular, consistent reporting on such changes, particularly in a sufficiently accessible or informative manner geared to the variety of stakeholder and public needs.

2. At a more micro level, there are felt needs for data, or more complete data, of direct relevance to specific environmental issues and specific stakeholder interests. Lead in gasoline, acid rain, and renewable resources, including water, illustrate areas where relevant data needs exist.

3. Equally, however, it is apparent that existing data, and to some extent analysis of those data, are underutilized. This appears to arise for a variety of reasons, including insufficiently wide dissemination, lack of appropriate data access arrangements for stakeholders and users and an absence of reliable, informative summaries of changes to our environment presented on a comprehensive yet understandable basis.

4. It is important to recognize that there are gaps, ambiguities and uncertainties in present data and data collection arrangements. Yet there is no systematic mechanism for identifying where such gaps exist and establishing priorities for new data collection.

5. A particular area of data deficiency relates to environment-economy linkages, which are only beginning to be documented. There is insufficient data on environment-dependent industries based on renewable resources. There is also a need for data to enable us to evaluate the effectiveness and efficiency in both economic and social terms of measures being taken to improve environmental performance or reduce environmental stress. For example, we need to be able to relate the level and types of investment in environmental protection to benefits so that we can be clear on what the payback is and consider alternatives where those are indicated. Data should be available to enable us to develop, consider and evaluate alternative scenarios and policy approaches.

6. Timely and relevant data can also play an important role in environmental protection itself. Timely collection of data enhances accountability and performance in the implementation and evaluation of environmental protection measures by government, industry and others.

7. There is a particular need to ensure smooth, well-organized data flow between the provincial and federal levels of government, industries and the public. All governments need to recognize the broader public interest in good data collection and access. Environmental impacts do not honour political boundaries or legislative jurisdictions. Special efforts may be needed to overcome the reluctance of governments to collect data in areas where they may not have full management or policy responsibility; or to make data they have available because of concern as to how it will be used.

8. Access to and accessibility of data on the environment and economy-environment linkages are also important considerations. Stakeholders need efficient data access arrangements to meet their information and problem-solving requirements. Accessibility of data to the public and the media implies simplicity and clarity of presentation.

9. Perhaps most important of all is the need for data which is widely trusted in terms of relevance and reliability. There is a frustration with real or suspected partisanship in the collection and presentation of data by various stakeholders to advance or protect their own interests. There is a need to replace confrontation with cooperation not only in resolving issues in the public interest, but in developing the necessary information base.

10. This specifically points to the development of mechanisms for stakeholders to participate in evaluating data collection approaches, and priorities; in data synthesis and integration; and in developing approaches to data interpretation and analysis.

Guidelines for Action: 3-Year Stakeholder Advisory Group

The following approach is recommended:

A multistakeholder group to:

a) evaluate existing institutional arrangements, explore new alternatives and evolve, over a 3-year period, appropriate policy and institutional changes for environmental and economy-environment data collection and dissemination;

b) move towards an independent mechanism or to ensure direction and coordination in the mechanism development and presentation of environment-economy data on a national basis.

The objective of the advisory group would be to develop a sound understanding of existing policies, institutions and data bases, and to evolve appropriate new arrangements to address the 10 concerns identified above.

The advisory group would include appropriate representatives from all key stakeholder groups including appropriate federal agencies, provincial governments, industry and business, labour, environmental organizations, consumer groups, scientific and professional disciplines, and others as appropriate.

Based on the 10 data-related concerns identified above, the advisory group would:

- examine and evaluate existing data availabilities in relevant environment and economy-environment areas;

- consider quality control practices in the available data bases;

- review established policies and institutional arrangements;

- propose and evolve achievable next steps, such as:

  - policy changes with respect to data collection and dissemination;
  - structural changes to data collection/dissemination networks;
  - new or adaptive institutional arrangements;
  - mechanisms to address ad hoc or issue-specific data requirements;
  - other measures suggested in the specifications for new institutional arrangements listed below.

A 3-year time frame is considered appropriate for the advisory group to evolve significant next steps in a very complex area.

EXAMPLE OF A NEW INSTITUTION FOR ENVIRONMENTAL DATA

Institutional Arrangements

1. Steps should be taken towards building and evolving a national, independent, professional institution to coordinate the collection, assembly and presentation of information on the changing state of the environment and economy-environment linkages. The U.S. Council on Environmental Quality; the British standing Royal Commission on Environmental Pollution; in the economic field, the Economic Council of Canada; and the Canadian Centre for Occupational Health and Safety are possible models.

2. A major part of the mandate of this new institution should be reporting on a regular basis on emerging trends in environmental quality and other issues. Certain reports would be issued on an annual basis. In other instances, it is recognized that many issues can only be meaningfully measured across longer time frames, such as up to five years. Some issues will justify special or more frequent reports.

3. The objective of the new institutional arrangements should be building a common, trusted information base on key environmental issues. Data collection and assembly must be on a professionally sound basis, but must also be accessible to and adequately reflect the needs of various audiences - specifically the general public and a broad range of stakeholder interests.

4. To this end, the new institution should be governed by an independent governing body, actively guided by an advisory council of stakeholders to ensure that data base development, use and interpretation takes place on a consultative basis. Through representation on this advisory council, stakeholders should have an opportunity to review and comment on reports. The advisory council should be drawn from federal, provincial and municipal governments, business, labour, environmental organizations, those scientifically and professionally interested in environmental issues, consumer organizations and others.

5. In addition to its data collection and assembly mandate, the new institution should be asked to develop criteria to evaluate emerging environmental issues and trends.

Approaches

6. Data collection and assembly tasks should be practicable, and not so large and complicated as to be easily abandoned.

7. There should be recognition that data base problems are insolvable in the short term. What is important is to take intelligent, progressive steps based on existing data, and the identification of priorities for the future.

8. There must be developed reliable priority-setting mechanisms which attract a broad stakeholder consensus to address new forms of data collection and assembly. New data collection should include pro-active, crisis-preventing information to facilitate effective environmental planning.

9. There should be an objective presentation and disclosure of the current state of environmental data, identifying and evaluating the importance of major gaps in existing data.

10. With particular reference to economic issues, data collection should build on established statistical frameworks. Designing a whole new sytem of economic and environmental accounts is likely to be impractical. At the same time, there must be a sensitivity to the need for innovations in existing economic statistics because they have not been designed to fully accommodate environmental issues.

Accessibility of Information

11. A specific effort must be made to present environmental information in a form which is accessible to the public and the media in terms of readability, clarity, avoidance of technical jargon and qualifications, and use of visual and audio-visual presentational techniques.

12. Data access arrangements for more specific problem-solving needs should include a data bank on which all stakeholders can draw from a central source to meet their information requirements.

Role of Governments

13. New arrangements for federal/provincial cooperation in the collection and coordination of environmental data are necessary if the data base is to be significantly improved. This should reflect the principle that communities of interest in environmental and renewable resource issues do not follow political or constitutional boundaries, and that there are important benefits to all in building and sharing a sound information base. Specific efforts will be required to ensure information and data consistency across jurisdictions.

14. Care must be exercised in ensuring that environmental and economy-environment data collection on emerging priorities is not subject to arbitrary or artificial fiscal constraints. The economic and social benefits of data collection should be carefully weighed against the resources required to support data collection and assembly activities.

15. In addition to national approaches to the changing state of the environment, "state of the region" reports might also be prepared on a basis consistent with national data, including appropriate mechanisms of consultation.

Types of Data Development

16. Data collection and assembly should include the following main categories:

    a) the types and consequences of environmental stress;
    b) the sources and structure of environmental stress;
    c) the state of renewable resources;
    d) current environmental management;
    e) specific areas of concern;
    f) tracking of key changes in environmental quality;
    g) Canada in a global context.

Economy-Environment Linkages

17. Data collection should give priority to appropriate data in relation to economy-environment linkages. This should include:

    a) data on environment-dependent industries such as forestry, fisheries, agriculture, tourism and recreation, energy, and water transportation;
    b) economic impacts of various forms of pollution;
    c) actual and projected costs and benefits of investment in environmental stress reduction on an industry sector or other appropriate base;
    d) impacts of environmental issues on output, incomes, employment and inflation.

18. The building of an entirely new conceptual framework for environment-economy linkages is likely to prove impractical in the near term. In the long term, data collection should build towards systematic linkages between environmental and economic issues including capital asset values of renewable resources and new systems of economic accounts.

APPENDIX B

STATE OF THE ENVIRONMENT REPORTS

FOR FRANCE, U.S.A. AND INDIA

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STATE OF THE ENVIRONMENT - AN ASSESSMENT AT MID-DECADE

THE CONSERVATION FOUNDATION, U.S.A. 1984

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1982

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APPENDIX C

OECD THE STATE OF THE ENVIRONMENT

(ENVIRONMENTAL DATA-COMPENDIUM 1985)

(Table of Contents Only)

OECD ENVIRONMENTAL DATA-COMPENDIUM 1985

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THE WORLD RESOURCES INSTITUTE

(Table of Contents Only)

WORLD RESOURCES 86: AN ASSESSMENT OF THE RESOURCE BASE THAT SUPPORTS THE GLOBAL ECONOMY

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APPENDIX E

STRUCTURE OF THE

"STRESS" FRAMEWORK

FOR

ENVIRONMENTAL DATABASE DEVELOPMENT

(with Example Statistics)

Statistics Canada 1985

Structure of the STRESS Framework (Examples of Statistics)

Stressor Categories	Activity Statistics	Environmental Stress Indicators	Collective and Individual Response
I Generation of waste Residuals	Production - Mining - manufacturing - energy Consumption - households - service industry*	- waste residual generation - pollution loading - hazardous wastes - acid deposition	- pollution abatement - control of hazardous wastes - recycling - energy conservation - low waste technology
II Permanent Environmental Restructuring	Capital Investment - land - building - transport networks	- land conversion - habitat modification	- land use control - environmental rehabilitation - landscape conservation
III Harvesting	Production - agriculture - forestry - fishing - hunting.	- harvest technology - chemical application - over-harvesting	- harvest practices - pesticide control - harvest quotas
IV Depletion of Non-Renewable Resources	Investment/ Depletion - resource exploration - reserve estimates	- exploration activity - low grade resource exploitation e.g., Tar Sands	- conservation actions - substitution actions
V Natural Activity	Background - climate - hydrology - geophysical events	- floods - droughts - earthquakes - landslides	- protection from natural hazards
VI Population Dynamics	Consumption - demography - natural populations	- growth - distribution - migration - density	- population management - wildlife management

Environmental Response Indicators	Stock of Environmental Assets
Environment Quality - air - water - land - urban and rural landscape Ecosystem Health - diversity - productivity - genetic stock Sustainable Yield - soil erosion - agricultural yields - fish populations - forest regeneration Human Health - mortality and morbidity rates - environmental health risk indicators	Water Resource - stock-flow - geographical distribution Land Resource - soil distribution - agricultural potential Forest - stock (area, volume, species) - geographical distribution Fish - stock (population, species) - geographical distribution Wildlife - population - habitat - gene pool Non-Renewable Resource - mineral reserves - fossil fuel Man-made Stock - cultural and historical sites - man-made infrastructure

*Although in the National Accounts services are treated as production - from an environmental perspective they are essential consumption activities - since they do not transform materials or energy.

APPENDIX F

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